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Cue masking and cultural signals: Testing context-specific preferences for bald(ing) leaders☆

Nancy M. Blaker[a,*], Brian R. Spisak[a,c], Joshua M. Tybur[b], Michal Kandrik[b], Richard D. Arvey[d]

[a] Department of Management, University of Otago, New Zealand
[b] Department of Experimental and Applied Psychology, VU Amsterdam, the Netherlands
[c] Department of Management & Organisation, VU Amsterdam, the Netherlands
[d] Department of Management and Organisation, National University of Singapore, Singapore

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ABSTRACT

Androgenic Alopecia affects the majority of aging men and consequently a substantial number of leaders. Yet, there is little research on how male pattern baldness (MPB) influences leader perceptions, and no research on context-specific leader preferences for bald men. Across three studies, we add to this sparse literature by investigating a) how baldness as a biological cue for age (i.e. MPB) affects various trait perceptions, as opposed to baldness as a cultural signal for dominance (i.e. a shaved head), and b) how this information influences contingent leader preferences across coordination problems. We hypothesized a preference for a dominant leader appearance (shaved head) during war vs. peace, and a preference for an older leader appearance (MPB) during exploitation vs. exploration. In Study 1, we find that men with MPB are indeed perceived as older and that head shaving attenuates this age cue while increasing perceived dominance. Studies 2 and 3 do not show increased leader preferences for men with MPB or men with shaved heads, in any context. Instead, both studies show a particular dislike for men with a shaved head when the coordination problem requires intergroup peacekeeping.

1. Introduction

Male pattern androgenic alopecia, also known as male pattern baldness (MPB), is the process whereby men lose hair from their scalp due to a genetic predisposition and circulating androgens, mostly associated with older age (Sinclair, 1998). MPB affects half of all men by the age of 50, and it increases progressively in prevalence with age (Soni, 2009). Men who experience hair loss can be negatively affected by the process, and become more self-conscious, preoccupied, and dissatisfied with their appearance (Budd, Himmelberger, Rhodes, Cash, & Girman, 2000). The industry for male hair loss treatment is growing, with medical and surgical interventions to provide men with a full head of hair gaining in popularity. Besides medical treatments, there are also easier ways to conceal male balding. For instance, a survey of 729 balding European men showed that approximately one third of the sample had tried shaving their head in an attempt to mask the signs of MPB (Alfonso, Richter-Appelt, Tosti, Viera, & Garcia, 2005). Naturally going bald with age or deciding to mask that age cue with head shaving could alter how men are perceived in the eyes of others (Mannes, 2012).

With regard to leadership, many men vying for prominent leader positions are at an age to experience MPB. For example, both Fortune 500 CEOs and United States Congressmen enter leadership roles in their fifties, on average (Donovan, 2015; Manning, 2018). Considering the prevalence of MPB among leaders and the importance of physical appearance for leadership perception, the dearth of research into the effects of baldness on leaders is surprising. This current paper is the first to investigate how baldness (both from MPB and shaving) affects leadership perception and preference across different situations.

1.1. Perceptions of baldness

A vast body of existing research shows how important physical appearance is for person perception and leader preference. For instance, people rapidly and automatically make social attributions from others' facial appearance (for reviews see Olivola, Funk, & Todorov, 2014; Todorov, Olivola, Dotsch, & Mende-Siedlecki, 2015), and use information from facial traits to inform leadership perception and voting decisions (e.g. Antonakis & Dalgas, 2009; Little, Roberts, Jones, & DeBruine, 2012; Re & Perrett, 2014; Todorov, Mandisodza, Goren, &

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* Corresponding author at: Department of Management, 60 Clyde Street, Dunedin 9016, New Zealand.
E-mail address: nancy.blaker@otago.ac.nz (N.M. Blaker).

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Hall, 2005). Despite baldness being a salient feature of physical appearance, it has received relatively little attention in terms of its effect on leader perception and preference.

A number of empirical studies have investigated impression formation of men with MPB, and the general conclusion is that balding men look older and less physically attractive to perceivers compared to nonbalding men. For instance, one study (Cash, 1992) compared perceptions of men with naturally occurring MPB to men with naturally occurring full heads of hair (using unedited photographs as stimuli), and found that perceivers rated balding men as older, less physically attractive, and less socially attractive. Furthermore, a study using photographs of men manipulated to convey a stage of MPB (using latex bald caps) or a full head of hair (using a wig) provided experimental evidence that balding men were rated as older, less aggressive, more socially mature, and less attractive (Muscarella & Cunningham, 1996). Finally, a survey study (not using photographic stimuli) in Korea also indicated that people tend to describe balding men as looking older and less attractive, compared to nonbalding men (Lee, Ha, Kim, Kim, & Kim, 2002). However, to our knowledge, there is no evidence to suggest that baldness affects leadership perception or voter preferences. In one experimental study testing for a possible U.S. voter bias against balding men, participants in a simulated voting paradigm showed no favor towards potential leadership candidates depicted with a full head of hair or with a stage of MPB (Sigelman, Dawson, Nitz, & Whicker, 1990).

There is also very limited research on perceptions of men who are bald due to a shaved head rather than the natural aging process. On the basis of three studies, Mannes (2012) concluded that men with shaved heads are perceived differently than both men with a full head of hair and men with signs of MPB, likely due to stereotypical associations of shaved heads with masculinity and dominance. Using unedited and digitally edited photographs of men with shaved heads and full heads of hair, the first two studies showed that the men with shaved heads were perceived as significantly more dominant, taller, stronger, and less attractive. No differences emerged in terms of leadership perception. The third study used written scenarios to compare perceptions of a man described as having either a shaved head, thinning hair, or thick hair. When described with a shaved head compared to a full head of hair, the man in the scenario was rated higher on dominance, masculinity, strength, confidence, and leadership. However, there was no significant difference in leadership perception between a man with thick hair and thinning hair or a shaved head. To our knowledge, this third scenario study, which did not use any visual stimuli, is the only research directly comparing perceptions of shaved heads, a sign of MPB (i.e. thinning hair), and a full head of hair. Using visual stimuli is important in order to control for other differences that may automatically come along with imagining a man described with a full head of hair, a man with thinning hair, and a man with a shaved head.

1.2. Age cues and dominance signals

Baldness as a result of MPB and baldness as a result of shaving thus could provide different information. Compared to nonbalding men (and to each other), shaved heads are seen as more dominant whereas men with MPB are perceived as older. From a biological perspective, two types of traits provide information to perceivers: *cues* and *signals* (Jamie, 2017; Maynard Smith & Harper, 2003). MPB is likely a passive biological *cue* of aging, meaning that it is an incidental source of information to unintended observers that has not evolved for the specific purpose of communicating older age. Individuals can gauge others' age with relatively high accuracy on the basis of a vast range of physical cues which occur naturally and reliably with older age (for a review see Montepare & Zebrowitz, 1998), including changes in hair (baldness, hair thickness, pigmentation) and facial features (wrinkles, craniofacial proportions). On the other hand, shaved heads may represent either an active attempt to mask a biological cue of aging or to communicate (i.e., *signal*) a specific quality (e.g., dominance).

Signals differ from cues in that they function to convey information to others, benefitting the sender by influencing the receivers' behavior. For instance, a mating call is a signal which has evolved to attract others, whereas a territorial call is a signal which has evolved to keep others at a distance (Krebs & Dawkins, 1984). Biological signals are thus a result of natural or sexual selection, and are often not intentionally manipulated by the sender (e.g., a bird cannot consciously influence how colorful and large its plumage is). However, from a human psychology perspective, signals are often the result of active manipulation, and can convey culturally specific information. In the U.S. (and other Western countries), a shaved head is expected to signal information due to its association with certain populations, subcultures, or groups, which are perceived as stereotypically dominant, masculine, or aggressive (Mannes, 2012). These include military personnel, inmates, and professional fighters. Even though the original function of head shaving by these groups was likely not to signal dominance, this association can be co-opted by others for that purpose (e.g. skinheads, neoNazis, gang members). We hence consider head-shaving a *cultural signal*, meaning that the interpretation of that signal is culturally specific. For instance, non-Western populations possibly have very different stereotypes (if any) about men with shaved heads (e.g. Buddhist Monks).

Importantly, note that this research views a shaved head as a dominance signal specifically from the perspective of the receiver. The dominance signal associated with shaved heads is sent to others regardless of the intention of the individual with the shaved head. Whereas balding men may shave their heads in order to conceal a cue of aging and instead communicate youthfulness and attractiveness to perceivers (Alfonso, Richter-Appelt, Tosti, Viera, & García, 2005), they may inadvertently also signal dominance.

1.3. Context-contingent leadership preferences

Though baldness affects how men are evaluated regarding their age (MPB) and dominance (shaved heads), and increased age and dominance have both been linked to leadership perception and preference, there is no evidence that baldness relates directly to being perceived or preferred as a leader. The lack of evidence so far for an effect of baldness on leader perception or preference can perhaps be explained by considering that the perceived value of a leader is clearest when a contingent connection between traits and context is established (Spisak, Dekker, Krüger, & Van Vugt, 2012; Spisak, Homan, Grabo, & Van Vugt, 2012). From an evolutionary perspective, leadership arguably emerged as a result of our species' social group strategy, which facilitates resource acquisition and retention, but comes at the cost of increased coordination efforts (Van Vugt, Hogan, & Kaiser, 2008). Humans throughout history have needed to coordinate efforts in a variety of challenging contexts, for instance in order to defend territory and resources (i.e., war), to create diplomatic ties to grow groups (i.e., peace), to search for new opportunities and manage change (i.e., exploration), and to develop efficient methods for benefitting from existing resources in a stable manner (i.e., exploitation). Thus, we can define leadership as an adaptive process – consisting of leaders, followers, and context-specific requirements of the situation – for organizing and mobilizing collective action to solve coordination challenges (Spisak, Grabo, Arvey, & Van Vugt, 2014).

Previous research on implicit leader preferences can be extended by considering how the cues and signals associated with male baldness are evaluated in different settings. First, assuming that shaved heads are indeed associated with increased dominance, it is likely that men with shaved heads will be preferred in a setting where followers benefit from the specific features of a dominant leader. Dominance is associated with formidability, aggression, and masculinity, which may be beneficial leader qualities in some situations, but not others. Previous research on leader preference has shown that a dominant facial appearance is preferred for war-time, but not for peace (Laustsen & Petersen, 2017;

Little, Burriss, Jones, & Roberts, 2007; Re, DeBruine, Jones, & Perrett, 2013; Spisak, Dekker, et al., 2012; Spisak, Homan, et al., 2012). Similarly, shaved heads may be seen as a desirable feature for a leader when there is escalation of conflict with a hostile outgroup, but may be undesirable when peace needs to be brokered or actively maintained with that outgroup. Due to a shaved head's association with dominant, aggressive groups, perceivers may also attribute higher levels of masculinity and lower levels of intelligence to a potential leader with a shaved head (composite faces based on low intelligence ratings are seen as more masculine than faces based on high intelligence ratings; Spisak, Blaker, Lefevre, Moore, & Krebbers, 2014). These additional attributions could further reinforce the contextual preference for a shaved head during active intergroup conflict but not intergroup peacekeeping.

As is the case for dominance, previous research has shown that preferences for leader age also vary across situations requiring exploration or exploitation. The so-called exploration/exploitation tradeoff (March, 1991) represents the dilemma between investing resources into the exploration of new possibilities to achieve change (characterized by higher risk, but necessary for innovation and progress), and the exploitation of existing resources to maintain stability. The requirements of leadership for exploration could be perceived as a good match for younger individuals, who tend to be higher on risk-taking (Rolison, Hanoch, Wood, & Liu, 2013) and are expected to be less resistant to change (Brooke & Taylor, 2005). On the other hand, exploitation may be a better match for older age, as the knowledge and experience that accumulates over time may be particularly valued in order to achieve continued success in an established stable context (Jiménez & Mesoudi, 2019). In support of this age-contingent leader preference, three experiments using a simulated voting paradigm showed that younger leaders are preferred for situations requiring a focus on exploration, whereas older leaders are preferred for creating stability in situations requiring a focus on exploitation (Spisak, Grabo, et al., 2014).

The age-contingent preference for exploration versus exploitation could translate to a preference for leaders with MPB - assuming MPB is used as a cue to older age - when an existing situation needs to be maintained and established resources need to be exploited. Conversely, a full head of hair is likely perceived as a reliable cue for younger age, and this cue of relative youthfulness may lead to a preference for men with a full head of hair during change and exploration.

2. The present research

We present three experiments investigating how baldness resulting from MPB and baldness resulting from head shaving differentially affect leader preference across contexts. Our main argument is that MPB, as a cue of older age, will be preferred during exploitation (and not exploration); and a shaved head, interpreted as a dominance signal, will be preferred during war (and not peace). Study 1 tests how shaved heads, MPB, and a full head of hair affect trait perceptions, including general (context-free) leadership perception. This first study serves to replicate findings from previous research (e.g. Cash, 1992; Mannes, 2012; Muscarella & Cunningham, 1996) with some methodological improvements. We use a large number (31) of real male faces of a realistic age range to display signs of MPB, whose hair has been digitally edited to visually represent a shaved head, MPB, and a full head of hair. Study 1 tests the following hypotheses about general trait perceptions of bald(ing) men:

H1a. Men with shaved heads (vs. MPB and full hair) are perceived as more dominant and masculine; also, men with shaved heads (vs. MPB and full hair) are perceived as less intelligent.

H1b. Men with MPB (vs. full hair and shaved heads) are perceived as older.

Additionally, perceptions of leadership (i.e., looking like a typical leader - no differences expected), attractiveness, and health are measured (with no specific a priori hypotheses attached).

Study 2 investigates a contingency model of leader preference for men sending a cultural dominance signal (shaved head), or conveying a biological cue to older age (MPB). To our knowledge, this is the first study to investigate perceptions of leader baldness across relevant contexts. We compare leader preferences for the different alopecic stages within four contexts, with the following hypotheses:

H2a. During war, men with shaved heads (vs. MPB and full hair) are preferred as leaders.

H2b. During peace, men with full heads of hair (vs. shaved and MPB) are preferred as leaders.

H2c. During times requiring stability/exploitation, men with MPB (vs. full hair and shaved) are preferred as leaders.

H2d. During times requiring change/exploration, men with a full head of hair (vs. MPB and shaved) are preferred as leaders.

Note that in our studies, the peace context will be characterized by a need for active peacekeeping between groups (as opposed to intragroup peace or absence of war).

2.1. Preregistered follow-up

Following data analysis of Studies 1 and 2, we conducted a third experiment focusing on leader preference for men with shaved heads during war, peace, and in a general context, leaving out the exploration and exploitation contexts. Additionally, we aimed to compare the degree of preference for a leader with a shaved head across those three contexts. In Study 2 we only hypothesized differences between hair styles within each context, and for Study 3 we thus also focus on testing how preferences for a leader with a shaved head differ across context. Study 3 was preregistered on the Open Science Framework (https://osf.io/ahsur/) and tests the following hypotheses:

H3a. Men with shaved heads (compared to full hair and MPB) are the most preferred leaders during intergroup conflict, and the least preferred during intergroup peacekeeping.

H3b. In a neutral context, there will be no preference for a leader with a shaved head, MPB, or full head of hair.

H3c. Men with shaved heads will be most preferred during intergroup conflict (compared to intergroup peacekeeping and a neutral context), and least preferred during intergroup peacekeeping (compared to intergroup conflict and a neutral context).

For all studies, sample sizes were determined before data collection, no interim analysis took place during data collection, and all data exclusions are reported. All experimental conditions are explicitly reported, and any measures or analyses not included in this manuscript are reported in Supplementary materials. For each study, all hypothesis tests are reported under the heading “Main results”, and all findings reported under “Additional results” should be considered exploratory.

3. Study 1

3.1. Method

3.1.1. Participants and design

Thirty-one men were photographed from a standardized distance, 24 of whom were enrolled in an MBA programme at a Dutch university and were participating in an unrelated study, and seven of whom were academic employees at a Dutch University. Each photo was digitally altered to create three within-target baldness conditions for each face, namely with *a*) a shaved head, *b*) male pattern baldness (MPB), and *c*) a full head of hair. The three versions of the 31 faces were all rated on seven traits (age, leadership, masculinity, dominance, attractiveness,

health, intelligence). For an example of the photographs used, see Appendix A.

We aimed to recruit 30 raters per condition (e.g. shaved, MPB, full hair), for a total of 90 raters per trait. Given that we assessed seven traits, we targeted 630 raters. A total of 634 U.S. based respondents (46.4% female, M_{age} = 35.41, SD_{age} = 10.20) participated, none of which were excluded. The majority of raters had either at least a college degree (60%), some college education (25%; including those currently enrolled), or had completed high school (15%). Raters identified their ethnicity as White (77%), Black or African American (11%), Asian (7.1%), Mixed (3.5%), American Indian (< 1%), or Other (< 1%).

3.1.2. Procedure

The 31 photographs were manipulated with Adobe Photoshop software by a professional digital artist to represent the three baldness conditions (shaved, MPB, and full hair). Raters completed a Qualtrics Survey via the Amazon MTurk website, agreed to an informed consent statement, and evaluated all 31 individuals in randomized order on a single trait. Raters saw a mix of the three baldness conditions over the 31 faces (the version was randomly selected each time for each face), meaning that on average every rater was exposed to faces with shaved heads one third of the time, faces with MPB one third of the time, and faces with a full head of hair one third of the time. Note that a rater only saw each target individual once, with either a shaved head, MPB, or a full head of hair. Raters never saw multiple versions of the same target individual. Those assigned to the trait "age" were asked to guess the age of each man (in years, open question), and those assigned to the trait "leadership" answered the question "Compared to the average man, how much does this man look like a leader?" on a 7-point scale (1 = Much less, 4 = Average, 7 = Much more). For the remaining traits (masculine, dominant, attractive, healthy, intelligent), raters responded to the question "Compared to the average man, how […] is this man?" on the same 7-point scale. Raters then reported some demographic information (sex, age, education, ethnicity), read a short debriefing statement, and were paid $1. The rating procedure lasted approximately 5 min.

3.2. Analyses

We used linear mixed models to test for effects of baldness condition on perceptions of men's age, masculinity, dominance, attractiveness, health, intelligence and leadership ability. All analyses were conducted using R version 3.6.0 (R Core Team, 2019), and lmerTest version 2.0–33 (Kuznetsova, Bruun Brockhoff, & Christensen, 2017). We regressed each of the seven trait variables on baldness condition (as a 3 level factor) and participant sex (effect coded; men = −0.5, women = 0.5). Following Barr, Levy, Scheepers, and Tily (2013), we modeled random intercepts for raters and stimuli. We also modeled random slopes for baldness condition across raters and stimuli, and random slopes for participant sex across stimuli. Effectively, these random slopes model variation in raters' perceptions of the three baldness conditions, variation in the effect of baldness conditions across stimuli, and variation in rater sex effects across stimuli. To test Hypothesis 1a and 1b, comparisons between the baldness conditions are reported as specified in each hypothesis. In addition, for exploratory purposes, we test all possible comparisons for effects of baldness on leadership, attractiveness, and health. The full R script for all studies can be downloaded from our Open Science Framework page (https://osf.io/ahsur/).

3.3. Results

3.3.1. Main results

See Table 1 for means per condition. For Hypothesis 1a, we tested whether shaved heads were rated higher in dominance, masculinity, and intelligence, compared to MPB and a full head of hair. First, men with shaved heads were perceived as more dominant than both men with MPB, $b = -0.24$, $se = 0.08$, $t(42.99) = -2.96$, $p = .005$, and men with a full head of hair, $b = -0.31$, $se = 0.09$, $t(36.67) = -3.39$, $p = .002$. Second, men with shaved heads were not rated higher on masculinity than men with MPB, $b = -0.02$, $se = 0.06$, $t(44.19) = -0.30$, $p = .764$. However, shaved heads were perceived as more masculine than men with full heads of hair, $b = -0.17$, $se = 0.07$, $t(49.99) = -2.33$, $p = .024$. Third, shaved heads were not perceived lower in intelligence compared to MPB, $b = 0.06$, $se = 0.08$, $t(36.58) = 0.84$, $p = .404$, but they were considered less intelligent than full heads of hair, $b = 0.21$, $se = 0.08$, $t(52.35) = 2.64$, $p = .011$. Hypothesis 1a is thus partially supported by the data, particularly concerning higher perceived dominance for shaved heads compared to both other baldness conditions.

Table 1
Means and standard deviations of rated traits per baldness condition.

	Shaved head	MPB	Full hair
Age	41.25 (10.67)	42.92 (10.59)	40.74 (10.62)
Dominance	4.33 (1.46)	4.04 (1.39)	4.03 (1.41)
Masculinity	4.30 (1.24)	4.32 (1.19)	4.13 (1.24)
Intelligence	3.98 (1.26)	4.08 (1.24)	4.24 (1.33)
Health	3.86 (1.38)	3.84 (1.20)	4.25 (1.25)
Attractiveness	3.39 (1.36)	3.29 (1.31)	3.79 (1.42)
Leadership	4.05 (1.43)	3.94 (1.46)	4.02 (1.51)

For Hypothesis 1b, results showed that men with MPB were indeed rated as older than both men with shaved heads, $b = -1.27$, $se = 0.33$, $t(37.06) = -3.84$, $p = .001$, and men with full heads of hair, $b = -2.05$, $se = 0.37$, $t(36.67) = -5.60$, $p < .001$. Thus, the results for Hypotheses 1a and 1b suggest that shaving one's head can indeed signal dominance and mask the biological cue of aging associated with MBP.

3.3.2. Additional results

Additional models tested how the baldness conditions affected perceived leadership, attractiveness, and health. First, there were no significant differences in perceived leadership across the three baldness conditions (all $ps > 0.05$). Second, men with full heads of hair were rated as more attractive than men with shaved heads, $b = -0.45$, $se = 0.08$, $t(50.37) = -5.64$, $p < .001$, and men with MPB, $b = -0.49$, $se = 0.09$, $t(47.13) = -5.76$, $p < .001$. Third, men with full heads of hair were also perceived as healthier than men with shaved heads, $b = -0.36$, $se = 0.10$, $t(76.63) = -3.77$, $p < .001$, and MPB, $b = -0.34$, $se = 0.08$, $t(38.26) = -4.55$, $p < .001$. There were no differences in perceived health and attractiveness between men with shaved heads and men with MPB (all p's > 0.05).

Because some models had convergence issues, we also ran simpler versions of these linear mixed models, which had comparable parameter estimates to the maximal models presented here (and did not change any conclusions). Also, we excluded participant sex from these models, which also did not change results. These results can be viewed on our Open Science Framework page. Across all models, participant sex did not affect trait ratings (all $ps > 0.05$), with one exception where male raters assigned higher overall scores for masculinity to the faces, $b = -0.22$, $se = 0.11$, $t(89.98) = -2.01$, $p = .047$. Considering participant sex mostly did not contribute to the results, we did not include it as a factor in follow up studies.

3.4. Discussion

The results from Study 1 show that trait perceptions of men are indeed affected by baldness. Most notably, men with shaved heads were perceived as more dominant than men with MPB and men with full heads of hair (Hypothesis 1a), and men with MPB were estimated as older than men with shaved heads and men with full heads of hair

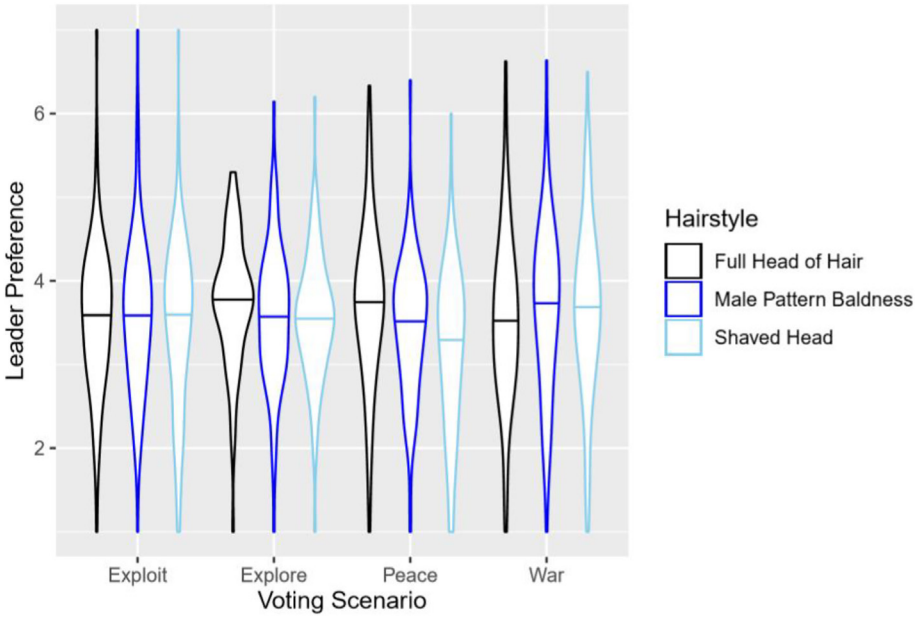

Fig. 1. Leader preference ratings per voting scenario condition, for each baldness condition in Study 3. The figure shows means (horizontal lines) and the distribution of the data.

(Hypothesis 1b). These results were in line with our hypotheses. However, although a shaved head was associated with lower intelligence and higher masculinity compared to a full head of hair, we did not find that men with shaved heads were evaluated as less intelligent and more masculine than men with MPB. In fact, the only trait perceptions which differed between the two types of baldness were dominance (higher for shaved heads) and age (higher for MPB). Exploratory analyses additionally showed that a full head of hair was associated with higher attractiveness and health compared to both types of baldness. Also, baldness did not affect perceived leadership in general, without specifying any particular context. For the most part, these results on trait perceptions of bald men show that our stimulus materials are evaluated on relevant traits as expected, and the next step is to test contingent leader preferences in different scenarios (e.g. are the more dominant shaved heads preferred in wartime).

4. Study 2

4.1. Method

4.1.1. Participants and design

The photographs from Study 1 were used, again each with three baldness conditions (shaved, MPB, full hair). A total of 400 raters (46.4% female, M_{age} = 34.32, SD_{age} = 9.71) rated the 31 targets on leadership preference, in one of four leadership contexts (war, peace, exploration, exploitation). As in Study 1, raters were shown one randomly selected version of each of the 31 targets in random order.

The goal was to recruit 30 raters via Amazon MTurk per hair condition (e.g. shaved, MPB, or full hair) per leadership context condition. Given that there were four leadership scenario conditions (war, peace, exploration, exploitation) that varied between raters, we aimed for a minimum of 360 raters. We set a maximum of 400 MTurk users to complete the survey, and the final dataset consisted of 400 raters. No data were excluded. The majority of raters had at least a college degree (61%), some college education (26%; including those currently enrolled), or had completed high school (14%). Raters identified their ethnicity as White (78%), Black or African American (8%), Asian (8%), Mixed (5%), American Indian (< 1%), or Other (1%).

4.1.2. Procedure

Following informed consent, participants read a short scenario describing the circumstances surrounding an upcoming national political election in which they would be voting. Raters were randomly assigned to one of four context conditions describing different coordination problems which the new leader would have to solve. They read either *a*) a *war* scenario in which they were asked to vote for a candidate that would be best for achieving victory, *b*) a *peace* scenario in which they were asked to vote for a candidate that would be best for achieving a peaceful resolution with another country, *c*) an *exploration* scenario about transitioning to the use of renewable energy resources in which they were asked to vote for a candidate who would be best for achieving this change, or *d*) an *exploitation* scenario about the need for continued use of valuable energy resources in which they were asked to vote for a candidate who would be best for achieving continued stability. Full scenarios can be found in Appendix B.

After reading the scenario, raters evaluated photographs of all 31 men on the item "How likely are you to vote for this person in the current situation?" (1 = Very unlikely, 7 = Very likely). As in Study 1, raters only saw one version (either shaved head, *or* MPB, *or* full hair) of each face, and the version they rated was randomly assigned with each of the 31 faces. Raters then reported basic demographic information and were debriefed and paid $1.

4.2. Analyses

Our analytic strategy was similar to that described for Study 1. We regressed leader preference on baldness condition (as a 3-level within-subjects factor) and leadership context condition (as a 4-level between-subjects factor). Again, following Barr et al. (2013), we modeled random intercepts for baldness and context condition, raters, and stimuli, and we also modeled random slopes for baldness across context conditions, raters and stimuli. For a full overview of all analyses and output, please refer to the R mark-up file on our Open Science Framework page (https://osf.io/ahsur/). Any models that prompted warnings about convergence were repeated with fewer random effects in the model. The results from these simpler models can also be found in the R mark-up files, and unless otherwise mentioned, did not change any conclusions.

4.3. Results

See Fig. 1 for an overview of mean leadership preference per condition. Analysis of the overall model revealed a main effect of baldness $F(2, 339.7) = 6.75$, $p = .001$, qualified by an interaction between baldness and leadership context $F(6, 354.3) = 5.08$, $p < .001$, but no main effect of leadership context $F(3, 208.8) = 0.77$, $p = .510$. This indicates that preferences for hair type differ across the four context conditions.

4.3.1. Main results

To interpret the omnibus interaction, we separately tested the main effect of baldness within each of the four leadership context conditions. First, we found no support for Hypothesis 2a, as there were no differences in wartime leadership preferences between men with shaved heads and men with MPB, $b = -0.01$, $se = 0.08$, $t(74.67) = -0.07$, $p = .941$, or men with full heads of hair, $b = -0.15$, $se = 0.11$, $t(51.59) = -1.35$, $p = .183$. Second, supporting Hypothesis 2b, leadership preference in the peace condition was higher for men with full heads of hair compared to men with MPB, $b = -0.30$, $se = 0.10$, $t(57.76) = -2.93$, $p = .005$, and men with shaved heads, $b = -0.49$, $se = 0.12$, $t(73.86) = -4.22$, $p < .001$. Third, results showed no support for Hypothesis 2c, as in the exploitation condition men with MPB were not preferred as leaders over men with full heads of hair, $b = 0.05$, $se = 0.10$, $t(37.36) = 0.48$, $p = .631$, or men with shaved heads, $b = -0.14$, $se = 0.07$, $t(32.25) = -2.03$, $p = .050$. Finally, regarding Hypothesis 2d, men with a full head of hair were not preferred over men with MPB in the exploration condition, $b = -0.17$, $se = 0.09$, $t(40.36) = -1.87$, $p = .069$. Though as expected, full heads of hair were preferred as leaders over shaved heads, $b = -0.23$, $se = 0.09$, $t(49.31) = -2.53$, $p = .015$.

4.3.2. Additional results

We further explored the finding that shaved heads were least preferred in the peace condition, as the means displayed in Fig. 1 suggested that rather than a full head of hair receiving a particularly high leadership rating during peace, shaved heads received a particularly low leadership rating during peace. First, we repeated the analysis for leader preferences during peace with shaved head as the reference category, and found that men with shaved heads were preferred less compared to men with MPB, $b = 0.19$, $se = 0.09$, $t(41.31) = 2.15$, $p = .038$. We then ran a linear mixed model with context condition as a main effect on leadership preference for shaved heads, comparing preference during peace with the other three context conditions. Leader preference for shaved heads was lower in the peace condition compared to the war condition, $b = 0.46$, $se = 0.18$, $t(103.14) = 2.53$, $p = .013$, and compared to the exploration condition, $b = 0.31$, $se = 0.14$, $t(311.59) = 2.14$, $p = .033$, but not compared to the exploitation condition, $b = 0.25$, $se = 0.14$, $t(259.90) = 1.77$, $p = .077$.

Also, we repeated the analyses for Hypothesis 2a and 2b (the effect of baldness in war and peace, respectively) including the dominance ratings of the faces obtained from Study 1 as fixed and random effects. In the war context dominance had a significant effect on leadership preference, $b = 0.60$, $se = 0.08$, $t(85.31) = 7.36$, $p < .001$. In the peace context, dominance was unrelated to leadership preference, $b = 0.02$, $se = 0.11$, $t(78.23) = 0.19$, $p = .849$. Including dominance in the model did not change the findings for Hypothesis 2a and 2b (i.e. all previously significant results were still significant, and all previously non-significant results were still non-significant when controlling for dominance of the leadership candidate).

Finally, we repeated the omnibus test (with context condition and baldness condition as main effects and their interaction), and added dominance as a main effect as well as the interaction effect between dominance and context. Results showed a significant interaction between dominance and context, $F(3, 207.14) = 17.00$, $p < .001$, indicating that the preference for dominance differs between the context conditions. Additionally, estimates confirmed that the effect of dominance on leadership preference was different between the war and peace conditions, $b = -0.66$, $se = 0.10$, $t(187.16) = -6.95$, $p < .001$.

4.4. Discussion

As expected, potential leaders with a full head of hair were preferred during peace (Hypothesis 2b). Also, leaders with a full head of hair were preferred over leaders with a shaved head during exploration, but not over leaders with MPB (Hypothesis 2d). Overall, we found no significant preferences for bald leaders over leaders with a full head of hair. Shaved heads were not preferred during wartime (Hypothesis 2a), and men with MPB were not preferred for exploitation (Hypothesis 2c). Concerning the expected age-contingent effects, the perceived age difference caused by MPB was possibly not large enough to elicit differential leadership preferences.

Considering the findings from Study 1, the increased attractiveness and health associated with a full head of hair could explain why bald (ing) men were not favored in any context. Perhaps cues to attractiveness and health contribute to increased leader preference (regardless of context), and dominance is only valued under specific circumstances, such as war. This may explain why men with shaved heads (who were perceived as more dominant in Study 1) were less preferred in peace, but were equally preferred to the more attractive men with full heads of hair during war. Additional analyses supported this line of reasoning, as shaved heads were less preferred during peace compared to war, and dominance ratings (from Study 1) were associated with higher leader preference in the war but not peace contexts. For Study 3, we aim to replicate findings that preferences for shaved heads were lower in peace contexts versus wartime contexts, and we also include a context-free control condition.

5. Study 3

5.1. Method

5.1.1. Participants and design

The same set of 31 targets (with three versions each, making 93 target images in total) used in Studies 1 and 2 was used here. The final dataset consisted of 423 MTurk users (50.5% female, $M_{age} = 38.22$, $SD_{age} = 12.96$), reached after excluding 18 raters on pre-determined criteria (see below for details). Study 3 had the same hairstyle conditions as Study 2 (shaved head, MPB, full head of hair), but raters judged the men on leader preference in one of three context conditions (war, peace, and general/context-free). The design was otherwise the same as in Study 2.

The goal was to recruit 440 raters via MTurk. This number was based on having 40 raters per condition, plus a barrier to account for potential data exclusions. At the time of data collection, there was a specific concern for MTurk users from other countries with low levels of English fluency posing as U.S.-based users. For this reason, we took additional measures to ensure our sample consisted of high-quality raters, namely a) an English fluency test ("Please write a few sentences describing your favorite leader" – rated for fluency issues independently by three native English speakers), and b) two general attention/comprehension tests based on a photo (correctly stating how many individuals on an image are women, and how many are wearing glasses). In total, 442 responses were recorded, and 18 raters were removed from the dataset for failing an English fluency test (all three native speakers rated their answer as non-fluent) or failing either of the attention checks. One additional rater was removed, as no leader preference data was recorded (possibly due to a technical glitch). This left the final dataset with 423 raters. All analyses were performed after data exclusions. The majority of raters had at least a college or associate degree (59.4%) and identified their ethnicity as White (79.5%). Others

identified their ethnicity as Black or African America (8.3%), Asian (5.7%), Mixed (5.7%), American Indian (1.4%), Hawaii Pacific (< 1%), or Other (< 1%).

Finally, raters were also asked what they thought the main purpose of the study was (open question). Out of 423 responses, 17 referenced baldness (for instance: "Balding and perceptions as a leader", or "My opinion of people with hair as opposed to people without hair") and an additional 4 mentioned "hair" or "hairstyles" not directly related to baldness (for instance: "Determining biases based on look, possibly by facial expression or hair"). An additional dataset was collected, which confirmed that raters were not suspicious of the importance of balding regarding our stimulus materials (for a full report of this additional dataset, please see the Supplemental materials).

5.1.2. Procedure

The procedure and materials were identical to Study 2 with the exception that raters were randomly assigned to one of three context conditions, where they read either a war, peace, or a general scenario (see Appendix B).

5.2. Analyses

For a description of the analytical procedure, please refer to "Analyses" in the method section of Study 2, as we performed the same tests for Study 3. In addition, we tested for contrasts between context conditions within each baldness condition. Also, please see the R code on our Open Science Framework page (https://osf.io/ahsur/) for all syntax and output from the reported analyses.

5.3. Results

Fig. 2 shows mean leader preference per condition. Overall results from the omnibus test were comparable to Study 2, with a main effect of baldness condition, $F(2, 36.4) = 9.83$, $p < .001$, qualified by an interaction between baldness and leadership context condition, $F(4, 421.23) = 4.39$, $p = .012$. This means that preferences for hair type varied across leadership context. There was no main effect of context, $F(2, 284) = 0.10$, $p = .907$.

5.3.1. Main results

Separate linear mixed models were tested for the effects of baldness condition within each leadership context, according to each hypothesis. First, there was no support for the first part of Hypothesis 3a, which stated that during war, men with shaved heads are preferred as leaders over men with MPB and men with full heads of hair. Results showed that men with shaved heads were not preferred as leaders compared to men with MPB, $b = -0.03$, $se = 0.07$, $t(33.90) = -0.36$, $p = .721$, and were less preferred as leaders compared to men with full heads of hair, $b = -0.18$, $se = 0.09$, $t(41.78) = 2.06$, $p = .046$. However, we did find that during peace, men with shaved heads were less preferred as leaders compared to MPB, $b = 0.18$, $se = 0.06$, $t(124.66) = 3.18$, $p = .002$, and full heads of hair, $b = 0.46$, $se = 0.09$, $t(53.92) = 5.32$, $p < .001$. Second, in the general context condition, comparisons revealed that men with a shaved head were less preferred than men with a full head of hair, $b = 0.28$, $se = 0.08$, $t(37.73) = 3.48$, $p = .001$, whereas there was no difference in leader preference between men with MPB and men with shaved heads, $b = 0.08$, $se = 0.07$, $t(38.50) = 1.27$, $p = .211$. Thus, unlike in Study 1, we did find a general (i.e. context-free) leadership effect of baldness, and there is no support for Hypothesis 3b.

Finally, Hypothesis 3c stated that shaved heads would be most preferred in the war context compared to peace and the general context, and least preferred in the peace context. Results did not support these expectations, as preferences for men with shaved heads did not vary

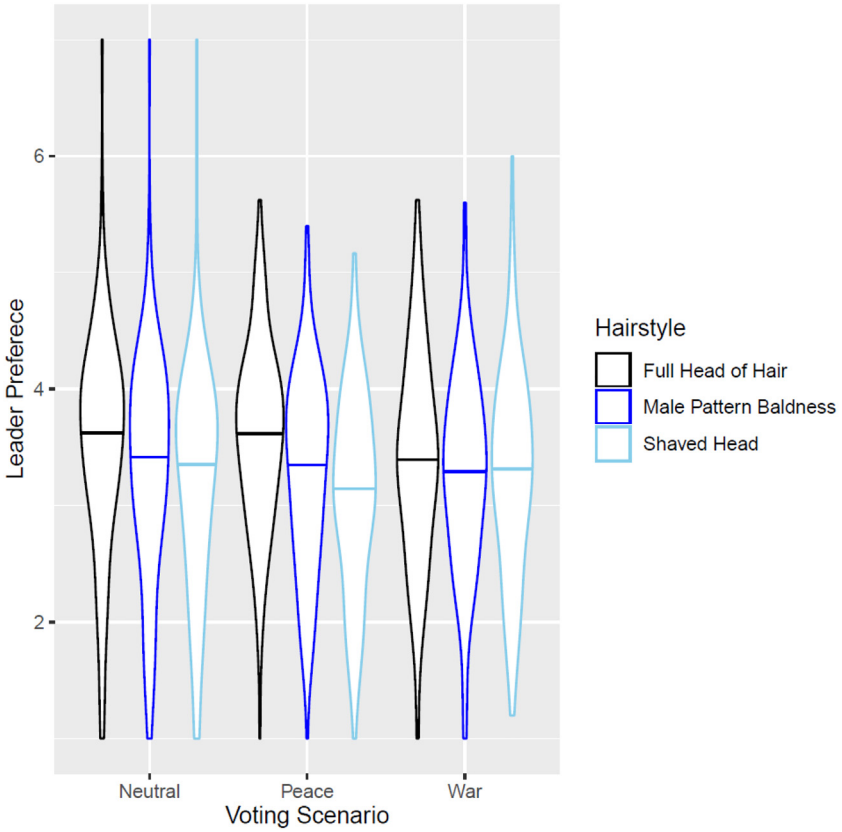

Fig. 2. Leader preference ratings per voting scenario condition, for each baldness condition in Study 3. The figure shows means (horizontal lines) and the distribution of the data.

across contexts, all $ps > 0.05$.

5.3.2. Additional results

So far, the analyses showed that a full head of hair was favored over shaved heads in every context. We ran the models again, this time with a full head of hair as the reference category, to establish whether a full head of hair was also preferred over MPB in each context. This was indeed the case, as a full head of hair was preferred compared to MPB in the peace context, $b = -0.27$, $se = 0.08$, $t(37.69) = -3.60$, $p < .001$, the war context, $b = -0.20$, $se = 0.08$, $t(33.77) = -2.47$, $p = .019$, and in the general context, $b = -0.19$, $se = 0.08$, $t(39.07) = -2.42$, $p = .020$.

Mirroring Study 2, we repeated the analyses for Hypothesis 3a and 3b (the effect of baldness in war, peace, and a general context) including the dominance ratings of the faces obtained from Study 1 as fixed and random effects. In the war condition, perceived dominance of the candidate leader positively related to leadership preference, $b = 0.36$, $se = 0.08$, $t(57.17) = 4.59$, $p < .001$. However, in the peace and general context conditions, there was no relationship between dominance and leadership preference, respectively $b = 0.15$, $se = 0.09$, $t(80.08) = 1.73$, $p = .087$, and $b = 0.16$, $se = 0.09$, $t(83.53) = 1.82$, $p = .072$. Controlling for dominance in the model did not change the findings for Hypothesis 3a and 3b. These results replicate the additional findings of Study 2, where we also found an increased preference for more dominant looking leaders in war but not in peace. Finally, we repeated the omnibus test on leader preference, with context and baldness condition as main effects and their interaction, as well as the main effect of dominance and the interaction effect between dominance and context. As in Study 2, results showed a significant interaction between dominance and context, $F(2, 227.47) = 12.87$, $p < .001$, indicating that the preference for dominance differed between the three context conditions (i.e., war, peace, and neutral). Additionally, estimates showed that the effect of dominance on leader preference was stronger in the war condition compared to the peace condition, $b = -0.30$, $se = 0.06$, $t(85.31) = -4.74$, $p < .001$.

5.4. Discussion

As expected, men with shaved heads were least preferred as leaders in the peace context, offering support to Hypothesis 3a. However, we again found no increased preferences for men with shaved heads during war. These results are identical to those found in Study 2 concerning shaved heads during peace, and shaved heads during war. However, unlike in Study 2, leadership preference for shaved heads was not lower in the peace condition compared to the war condition (Hypothesis 3c). Further, against expectations, preferences for bald leaders (both shaved heads and MPB) were lower than those for leaders with a full head of hair in the general context (Hypothesis 3b). Though a full head of hair was preferred over bald heads in every context, the interaction between baldness and context condition indicated that this preference differed significantly across the leadership contexts. The increased preference for a full head of hair over a shaved head appeared less strong during war, possibly because the increased dominance associated with shaved heads was valued for leaders only in that particular context condition.

6. General discussion

We conducted three experiments to test how perceptions of potential male leaders differ when they exhibit a biological cue for age (e.g. Male Pattern Baldness - MPB) or a cultural signal for dominance (e.g. a shaved head), and whether this affects context-specific leader preference. Specifically, we tested whether MPB was a cue for older age, and whether this affected leadership preference during times of exploration (and change) and times of exploitation (and stability). Also, we expected shaved heads to signal dominance, and tested whether this affected leadership preference during war and peace.

Overall, we found that whereas general trait perceptions were affected according to our expectations, this did not translate into an increased preference for leaders with MPB or a shaved head in contingent contexts. Instead, across Studies 2 and 3, there was a preference for a leader with a full head of hair in most of the presented political scenarios (peace and exploration in Study 2, and peace, war, and a general context in Study 3). Possibly, the increased attractiveness, health, and intelligence (as shown in Study 1) of men with full heads of hair gave them an overall perceived leadership advantage in Studies 2 and 3. The main consistent finding concerning contingent leader preference for bald men was a particular dislike for a leader with a shaved head in an intergroup peace context. Additional analyses showed that dominance of the potential leader (as measured in Study 1) was positively associated with leader preference in the war but not the peace conditions (Study 2 and 3), which could explain why the more dominant looking shaved heads did not do well in a peacekeeping context.

First, Study 1 showed that men with shaved heads were indeed perceived as more dominant than men with MPB or a full head of hair. Men with shaved heads were also perceived as more masculine and less intelligent than men with full heads of hair. However, there was no difference between the two types of baldness on perceived masculinity or intelligence. Also, Study 1 showed that men with MPB were indeed estimated as older than men with a shaved head and men with a full head of hair. Overall, these results suggest that men with shaved heads are indeed interpreted as more dominant by perceivers, and that MPB is used as a cue to older age. Additional results showed that a full head of hair was perceived as more attractive and healthier compared to balding and shaved heads, but there were no differences in general leadership perceptions. The findings from Study 1 are in line with previous research on baldness and trait perceptions, including that in general baldness does not affect leadership perception (Cash, 1992; Lee et al., 2002; Mannes, 2012; Muscarella & Cunningham, 1996).

Subsequently, Study 2 showed that men with shaved heads were significantly less preferred as leaders compared to men with MPB and full heads of hair in peace contexts, but not war contexts. Also, leader preference for shaved heads was lower during peacetime compared to war. Furthermore, even though MPB is a cue to older age, Study 2 showed that this did not translate into contingent leader preferences during exploration and exploitation. Results showed partial support for a preference for a full head of hair during exploration, but this result was likely not driven by a difference in age perception. Men with full heads of hair were not preferred over men with MPB during exploration, even though men with MPB were estimated significantly older than men with shaved heads and full heads of hair. Previous studies reporting a preference for older leaders during exploitation and younger leaders during exploration used stimuli with a wider range in age (decades difference rather than a few years difference; Spisak, Grabo, et al., 2014).

For Study 3, we focused on preferences for leaders with a shaved head in war versus peace contexts. Study 3 replicated findings from Study 2, namely that a shaved head was less preferred during peacetime compared to MPB and a full head of hair, but again failed to show any increased preference for a shaved head during wartime (H3a). It is striking that we find a contingent-preference in the peace rather than the war context, as previous research has suggested that war is more important in shaping leader preference than peace (Laustsen & Petersen, 2017). However, it is important to point out that our peace context was focused on active intergroup peacekeeping in order to avoid potential conflict escalation rather than a more passive peace scenario (the absence of war), or intragroup peacekeeping. Additionally, Study 3 showed an increased preference for leaders with a full head of hair in each context compared to leaders with MPB and shaved heads, including the general (i.e. context-free) one.

Our findings have several implications and provide direction for future research. First, we show that eliciting context-contingent leader preferences in war-time or conflict settings is not necessarily a

straightforward process of simply making yourself look more dominant. Although men with shaved heads were perceived as more dominant than men with full heads of hair, this did not translate into the contingent dominance-war leader preference much previous research on facial dominance has shown (e.g. Little et al., 2007; Re et al., 2013; Spisak, Dekker, et al., 2012; Spisak, Homan, et al., 2012). In line with this previously established war-dominance preference, additional analyses in Study 2 and 3 did show that faces with higher dominance ratings were significantly more preferred in war but not in peace. A cultural signal such as a shaved head is perhaps less influential for leadership preference than other biological dominance cues (e.g., facial structure). It is also possible that other cues from a full head of hair (i.e. attractiveness, health) were more influential in shaping increased leader preferences than the cultural signal of dominance sent by a shaved head, in most of the context scenarios. Our findings could then be interpreted as showing that there is a general preference for more healthy and attractive looking leaders, but that in a situation requiring war, traits such as dominance also become desirable.

The current research showed how potential male leaders are perceived depending on cues of age (i.e. MPB) and signals of dominance (i.e. shaved heads) using visually realistic stimuli across the full alopecic range. A few limitations should be taken into account, which can be addressed with future research. First, we used only Caucasian male targets for our visual stimuli, and all our raters were from a Western U.S. sample. This is a particular relevant point in the case of this research, as we are investigating *cultural* signals – this implies that future research into cultural signals of shaved heads should extend beyond the specific populations we investigated. The association between shaved heads and groups characterized by dominant and masculine stereotypes (see Mannes, 2012) may not be as prevalent outside the Western world. Furthermore, we measured leadership preference with a self-reported Likert-scale item indicating how likely people thought they would be to vote for each individual in a given scenario. A forced choice-paradigm should be considered for future research as this perhaps models a voting situation more accurately – voters ultimately choose one individual in an election.

Our scenarios depicted fictional situations, but it may also be valuable to test leader preferences for shaved heads using scenarios based on actual conflicts. Describing existing international conflicts would likely increase the emotional reaction of voters in the study to a level closer to what actual voters would experience when choosing a leader. Perhaps in case of a real threat, the more dominant and possibly more aggressive looking shaved headed individuals would become more desirable leaders. Furthermore, whereas the current studies tested differences in perceptions of men with shaved heads, balding men, and men with full heads of hair, it should be acknowledged that raters were exposed to a wide variety of facial cues which may have directly influenced perceptions or could have interacted with baldness to influence perceptions. For instance, future research could explore whether facial cues relating to dominance are amplified by other dominance signals, such as a shaved head. Finally, to further explore the increased dominance perception of men with shaved heads, a trait of particular future interest is physical formidability, defined as fighting ability or the potential to inflict physical harm (Sell, Tooby, & Cosmides, 2009). Mannes (2012) found that men with shaved heads are rated higher on measures relating to physical formidability - i.e. they are perceived as taller and stronger. Our finding that a shaved head is particularly not preferred for intergroup peacekeeping could be specifically due to the perceivers' association with formidability and related traits such as threat and aggression (see Fessler, Holbrook, & Snyder, 2012; Holbrook, Fessler, & Navarrete, 2016). On the other hand, other interpretations of dominance, (e.g., social dominance, prestige, status; Henrich & Gil-White, 2001) might not increase with a shaved head.

To conclude, we find that though bald(ing) men do not look any less like typical leaders, they are mostly less preferred as leaders compared to their full-haired counterparts. Also, although head shaving and MPB lead respectively to perceptions of higher dominance and older age, this does not translate into contingent leadership preferences previous research has shown using facial appearance (e.g. dominant face in war, older face during exploitation). Overall, a full head of hair had the most advantageous effects on leadership perception and preference. Finally, though the older age cue associated with MPB can indeed be masked by shaving off hair, this does not benefit leadership preference. Instead, it can bring a disadvantage for leaders during peace, possibly due to increased dominance associated with a shaved head.

Open practices

All datasets, R markdown files, and the preregistration for Study 3 can be found on our project page on Open Science Framework:https://osf.io/ahsur/, 10.17605/OSF.IO/AHSUR.

Appendix A. Examples of target face at all three levels of the alopecic range

Aside from the first example, these faces have been made unrecognizable to ensure anonymity after publication of this research article. However, the raters in our studies always saw the full unobscured faces of all 31 individuals. Note that raters only ever saw one of the three versions of the same individual. Also note that none of the targets were wearing eyeglasses or other fashion accessories, or had any significant amount of facial hair (nothing more than stubble). Hairstyles within the MPB and within the full hair conditions varied across individuals.

Appendix B. Context-specific scenarios for Study 2

War (Study 2 and 3)

Your country of Taminia is at war with the neighboring country of Robania. It has been an aggressive, costly, and competitive war with no side willing to concede. Recently, Robania has increased their forces and intensified their bombing raids. This has made everyone exceptionally concerned for their safety. You and your fellow citizens are determined to establish dominance over Robania in order to protect the lands, resources, and people of Taminia. Currently, your country is in the middle of a presidential election. Vote for a candidate you think is best for achieving victory.

Peace (Study 2 and 3)

Your country of Taminia has a cooperative relationship with the neighboring country of Robania. This alliance, however, has become strained due to conflicting policies of your respective governments. Both sides are threatening to restrict trade and close the borders. Also, it has been rumored that military forces will be mobilized within the next six months. If that happens, war is almost certain. Your fellow Taminians feel that physical conflict is something that should be avoided at all cost. Instead, the people want to restore cooperation with Robania through non-violent resolution. Currently, your country is in the middle of a presidential election. Vote for a candidate you think is best for achieving peace.

Exploration (Study 2)

Your country of Taminia is in a time of change and exploration. For example, Taminia has committed to exploring renewable resources such as solar and wind energy. It is important for the sustained success of Taminia to ensure this exploratory change happens. The people of Taminia all agree that exploring change is of the utmost importance. Currently, your country is in the middle of a presidential election. Vote for a candidate you think is best for achieving this change.

Exploitation (Study 2)

Your country of Taminia is in a time needing stability. For example, Taminia is rich in coal and oil, and it needs to exploit this resource to avoid economic failure. It is important for the sustained success of Taminia that this stable exploitation happens. The people of Taminia all agree that stable

exploitation is of the utmost importance. Currently, your country is in the middle of a presidential election. Vote for a candidate you think is best for achieving this stability.

Neutral (Study 3)

Imagine that you are a citizen of the country Taminia. Currently, your country is in the middle of a presidential election. Vote for the candidate you think is best.

Appendix C. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.jesp.2019.103936.

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